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## Clinical Report

### Surgical Management of the Trauma-Induced Abomaso-Cutaneous Fistula in a Lamb

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#### Abstract

**Case Description-** The most important causes of abomasal fistulation have been described in association with umbilical hernia and infection and trauma. A 2-month-old male lamb with an open orifice on the ventral abdomen was referred to the veterinary teaching hospital (VTH) of Lorestan University.

**Clinical Findings-** In this case, the lamb had the abomaso-cutaneous fistula due to unknown penetrating trauma. According to the owner's claim, the above-mentioned non-painful orifice was occurred in the ventral midline due to the rupture of abdominal swelling approximately 45 days ago. On physical examination, heart rate, respiratory rate, and body temperature were normal, but CBC showed slight neutrophilia and mild anemia.

**Treatment and Outcomes-** After local anesthesia around the fistula, the abomasum adhering to the ventral muscular ring was dissected and closed. Then the muscular ring was closed in a vertical mattress pattern and subcutaneous tissue and skin were sutured in the usual method.

**Clinical Relevance-** During the fistula examination through the surgical operation, a muscular ring surrounded by fibrous margins was observed with partial abomasal herniation from the muscular defect. Seemed that adhesion between the abomasum and subcutaneous tissue had prevented the development of diffused peritonitis. Early proper surgical intervention is useful for the treatment of trauma-induced abomaso-cutaneous fistulae in ruminants.

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## 1. Case Description

Fistula is a communication between two internal organs or leading from an organ to the surface of the body and it's a kind of an abnormal passage. The most important causes of abomasal fistulation in sheep has been described in association with umbilical hernia, infection, and trauma.<sup>1-3</sup> Surgical correction requires *en bloc* resection of the fistulated abomasum and affected abdominal wall, including a partial abomasectomy at the greater curvature of abomasum to remove the fistulated tissues.<sup>1,3,4</sup> A 2-month-old male lamb weighing 7 kg with relatively poor body condition was referred to the department of large animal surgery and anaesthesiology of the Lorestan University, with an open orifice on the ventral abdomen midway between the umbilicus and xiphoid cartilage of the sternum. According to the owner's claim, above-mentioned non-painful orifice was occurred in the ventral midline due to the rupture of abdominal swelling approximately 45 days ago.

## 2. Clinical Findings

On physical examination, heart rate, respiratory rate and body temperature (rectal) were normal. Digital examination of the orifice showed a non-sphinctered opening (fistula) between the abomasum and surface of the body with leakage of milk and green colored digesta and also muscular ring with fibrous edges was palpated in which this could be due to the acquired abdominal hernia. The pH of the green digesta was noted to be acidic (pH = 2) in nature. Blood sample was taken from jugular vein for complete blood count (CBC). Results show no significant changes in CBC, except for the slight neutrophilia and mild anemia.

## 3. Treatment and Outcome

Prior to surgery, 200 ml lactated Ringer's solution (I.P.P.C, Tehran, Iran) was administered through a jugular catheter.

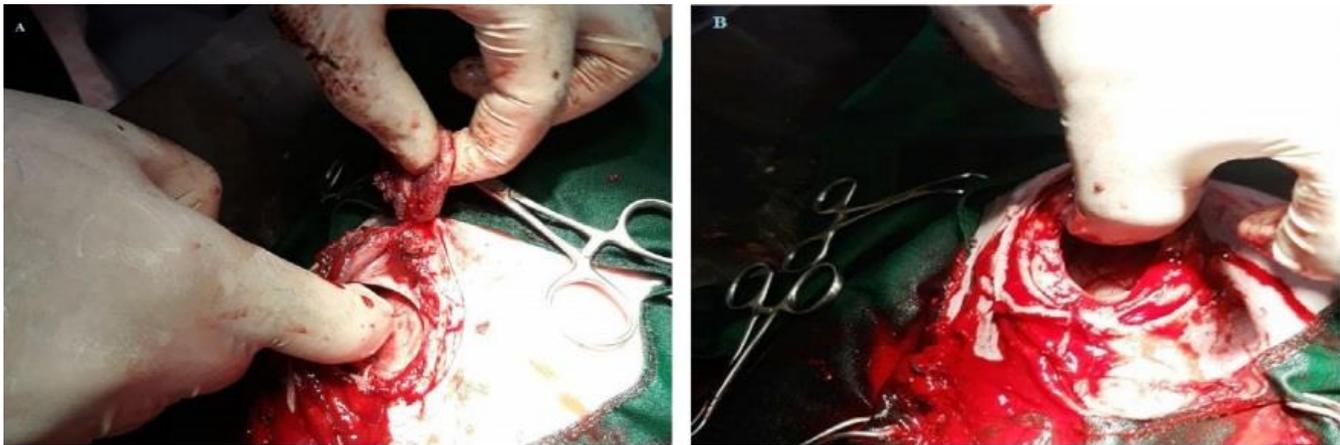
The lamb was put in dorsal recumbency and the area from the umbilicus to the xiphoid cartilage was prepared aseptically for surgery. Local anesthesia was given by subcutaneous injection of lidocaine HCl 2% (1 ml/cm<sup>2</sup>, Shahid Ghazi, Tabriz, Iran) around the fistula. After circular incision of the skin, the abomasum adhering to the muscular ring was dissected out and then lavaged using normal saline (0.9%) precisely (Figure 1) and the abomasum was closed with a double layer of lambert suture pattern (chromic catgut No. 2-0 Supa, Iran) (Figure 2). The muscular ring was closed by applying vertical mattress pattern (PGA No. 0 Supa, Iran). Subcutaneous tissue was sutured using simple continuous pattern with chromic catgut No.3-0 (Supa, Iran). After removing a centimeter from the edges of healthy skin in an elliptical shape, skin was closed using cruciate pattern with nylon No.0 (Supa, Iran). For postoperative medication, penicillin-streptomycin (Pen & Strep, 1 ml per 25 kg body weight, Norbrook, Northern Ireland), flunixin meglumin 1.1 mg/kg (Flumax M 5%, Rooyan Darou, Semnan, Iran) were administered Intramuscularly for 5 and 3days, respectively. Anti-parasitic drugs were administered to avoid myiasis (Alfamec 1%, 0.2 ml/10 kg body weight, Alfasan Woerden-Holand) and daily dressing of the closure site with oxytetracycline spray (OTC aerosol spray, Vetaque, Tehran, Iran) was the postoperative treatment plan. For postoperative management, high-quality soft diet and monitoring the closure site for any leakage was recommended. After 10 days, the lamb didn't have any leakage and normal defecation with significant healing in the closure site was seen.

## 4. Clinical Relevance

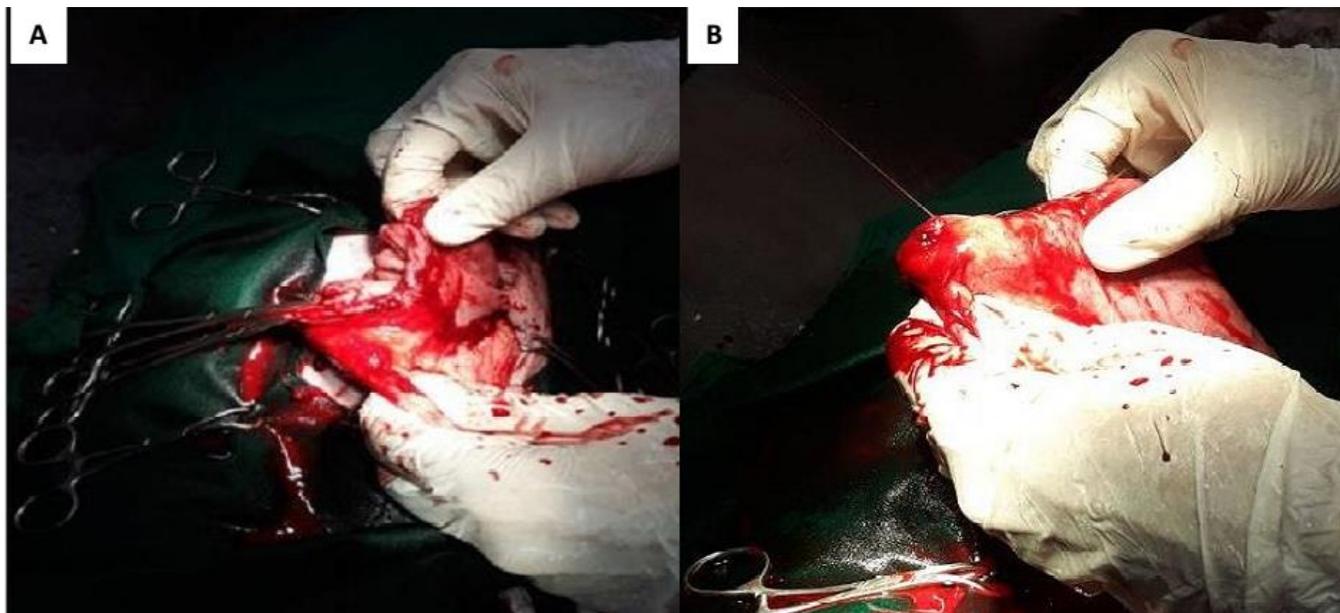
Abomaso-cutaneous fistulae have been frequently reported in calves, buffalo calves, and cow. The most reported cause of abomasum fistula is trauma subsequent to umbilical hernia or abomasopexy, however, congenital abomasal fistula was reported in buffalo calf.<sup>2,3,5</sup> To the best of our

knowledge, there is no report regarding to occurrence of an abomaso-cutaneous fistula in sheep resulting from a penetrating wound following acquired abdominal hernia. In ruminants and horse, most fistulae result from incarceration of the intestine in umbilical hernias.<sup>6-10</sup> However, abomaso-cutaneous fistula in sheep and goat could be made after umbilical herniorrhaphy<sup>6</sup>. A muscle ring with fibrous edges was observed during the surgical procedure which could be said that a portion of the abomasum had come out of this muscle defect. In this case, the lamb had acquired abdominal and abomaso-cutaneous

fistula due to unknown penetrating trauma. It seemed that adhesion between the abomasum and abdominal wall had prevented development of a diffused peritonitis. The peritoneal fluid analysis was not performed, which could be a limitation for the present case report. In previous reports, *en bloc* resection of the body wall and a wedge resection or segmental resection for removing ischemic or necrotic tissue of the intestine or abomasum performed following involvement of intestines or abomasum in the viscerocutaneous fistula in horse, calves and buffalo.<sup>11,12</sup> In this case, we performed an *en bloc* surgical



**Figure 1:** Circular incision of skin around the fistula (A). Muscular ring and herniated abomasum at wound on the ventral abdomen midway between the umbilicus and xiphoid cartilage of the sternum (B).



**Figure 2:** Elliptical incision around the fistula on the abomasum (A). Closure of the abomasal wall using Lambert pattern in 2 layers (B).

resection of the affected abdominal wall and a wedge-shaped resection of the necrotic abomasal wall. Hypochloremic metabolic acidosis can be resulted from leaking out digesta and milk from the abomaso-cutaneous fistula. Fubini and Smith have been suggested applying bandages for few days to stop loss of abomasal contents from small fistula.<sup>1</sup> However, the best method for this problem is surgery. The accurate recognition adhesion between the involved part and abdominal wall and possibility of abdominal cavity exploration is important for surgery of fistula.<sup>13</sup> In our case, the involved abomasum was completely freed from abdominal wall precisely, which was useful in preserving normal function of abomasum. Management of entero-cutaneous fistula is still a considerable challenge in human medicine. For surgical repair of abomasal fistula, correction of fluid and electrolyte disturbances, aggressive treatment of sepsis and control of fistula output are essential conservative measures before surgery, the same as entero-cutaneous fistula. We used ringer lactate serum before surgery. Trauma-induced abomaso-cutaneous fistulae require rapid local and systemic stabilizer and conservative procedures. Surgical repair of abomaso-cutaneous fistulae in most cases is not an emergency procedure, but the prognosis of surgical treatment can be good and can improve the body condition of the lamb. To put it in a nutshell, early proper surgical intervention was useful for treatment of trauma-induced abomaso-cutaneous fistulae and no local or general complication was observed postoperatively.

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### Conflict of Interests

None.

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